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NRC Order No. EA-12-051

RS-15-058

February 19, 2015

U.S. Nuclear Regulatory Commission
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Nine Mile Point Nuclear Station, Units 1 and 2
Renewed Facility Operating License Nos. DPR-63 and NPF-69
Docket Nos. 50-220 and 50-410

Subject: February 2015 Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)

Reference: (1) NRC Order Number EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, dated March 12, 2012 (ML12054A679)

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued Order EA-12-051 (Reference 1) to Constellation Energy Nuclear Group, LLC (CENG) for Nine Mile Point Nuclear Station, LLC, (NMPNS) Units 1 (NMP1) and 2 (NMP2). Reference (1) requires submission of a status report at six-month intervals following submittal of the overall integrated plan. Attachments (1) and (2) provide the third Six-Month Status Report for NMP1 and NMP2 pursuant to Section IV, Condition C.2, of Reference (1). This report updates the milestone accomplishments since the submittal of the last status report, including any changes to the compliance method, schedule, or need for relief and the basis, if any.

There are no regulatory commitments contained in this letter.

If there are any questions regarding this letter, please contact Mr. Terry Syrell, Regulatory Assurance Manager, at (315) 349-5245.

A001
NRR

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 19th day of February 2015.

Respectfully,

Mary G. Korsnick

MGK/STD

Attachments

(1) NMP1 Six-Month Status Report (February 2015) for Reliable Spent Fuel Pool Instrumentation

(2) NMP2 Six-Month Status Report (February 2015) for Reliable Spent Fuel Pool Instrumentation

cc: Regional Administrator, Region I, USNRC
NRC Project Manager, NRR – Nine Mile Point Nuclear Station
NRC Senior Resident Inspector – Nine Mile Point Nuclear Station
Director, Office of Nuclear Reactor Regulation

ATTACHMENT (1)

NMP1 SIX-MONTH STATUS REPORT (FEBRUARY 2015)

FOR RELIABLE SPENT FUEL POOL INSTRUMENTATION

NINE MILE POINT NUCLEAR STATION, LLC
February 19, 2015

1 Introduction

The Nine Mile Point Unit 1 (NMP1) Overall Integrated Plan (OIP) was submitted to the Nuclear Regulatory Commission (NRC) in February 2013 (Reference 1), documenting the requirements to install reliable spent fuel pool level instrumentation (SFPLI), in response to Reference 2. Subsequently, a supplement to the OIP for SFPLI was submitted to the NRC in March 2013 (Reference 3). By letter dated June 5, 2013 (Reference 4), the NRC requested that NMP respond to a request for additional information (RAI) regarding the NMP1 OIP for Reliable Spent Fuel Pool Instrumentation. By letter dated July 5, 2013 (Reference 5), CENG responded to the June 5, 2013 RAI. By letter dated August 27, 2013 (Reference 6), NMP1 provided the first Six Month Update. By letter dated November 15, 2013 (Reference 7), the NRC provided NMP with its Interim Staff Evaluation (ISE) and RAI regarding the OIP for Reliable Spent Fuel Pool Instrumentation. By letter dated February 24, 2014 (Reference 10), NMP1 provided the second Six Month Update. By letter dated August 26, 2014 (Reference 11), NMP1 provided the third Six Month Update.

This status report provides an update of milestone accomplishments since submittal of the OIP, including any changes to the compliance method, schedule, or need for relief/relaxation and associated basis (if applicable). NMP1 has completed detailed design for the SFPLI System and completed site acceptance testing.

2 Milestone Accomplishments

The following milestones have been completed since the development of the OIP (Reference 1), and are current as of February 15, 2015.

- Submitted Overall Integrated Plan 1Q2013
- Issued Purchase Order for Instrumentation 2Q2013
- Commenced Engineering and Design 2Q2013
- Selected Instrumentation and Technology 2Q2013
- Submitted first Six Month update 3Q2013
- Submitted second Six Month update 1Q2014
- Received Spent Fuel Pool Instrumentation 2Q2014
- Completed Detailed Design 2Q2014
- Commenced installation of SFPLI System 4Q2014

3 Milestone Schedule Status

Table 1 provides an update to the milestone schedule to support the OIP (References 1 and 3). It provides the activity status of each item and the expected completion date, noting any change. The dates are planning dates subject to change as design and implementation details are developed. Any changes to the following target completion dates will be reflected in the notification of compliance to the commission.

Table 1
Status of Reliable Spent Fuel Pool Instrumentation OIP Milestones

Milestone	Target Completion Date	Status	Revised Target Completion Date
Commence Engineering and Design	2Q2013	Complete	
Complete Engineering and Design	1Q2014	Complete	
Respond to NRC ISE RAIs	3Q2014	Complete	
Receipt of SFP Instruments	3Q2014	Complete	
Commence Installation of SFP Instruments	4Q2014	Complete	
Close out Project/Plant Turnover	2Q2015	Started	

4 Changes to Compliance Method

One change has been made to the compliance methods described in the NMP1 Overall Integrated Plan (Reference 1). This change is related to the method used to determine the Level 2 Water Level.

As defined in NEI 12-02, Level 2 represents the range of water level where any necessary operations in the vicinity of the spent fuel pool can be completed without significant dose consequences from direct gamma radiation from the stored spent fuel and can be based on either 10 feet above the highest point of any fuel rack or at a designated level that is based upon plant-specific calculations. Subsequent to the submittal of the OIP and the last Six Month Update, NMP has elected to change its strategy of utilizing plant-specific calculations and will utilize the option to set Level 2 at an elevation 10 feet above the highest point of any fuel rack seated in the spent fuel pools. This results in a new Level 2 elevation of 325 ft. 11.5 in.. No new procedural controls are required. This information was provided and reviewed during the November 2014 NRC Audit.

No additional changes have been made to the compliance method since the August 2014 Six Month Update (Reference 11).

5 Need for Relief/Relaxation and Basis for the Relief/Relaxation

NMP1 expects to comply with the order implementation date and no relief/relaxation is required at this time.

6 Open Items from Overall Integrated Plan and Interim Safety Evaluation

Table 2 provides a summary status of the OIP open items documented in the August 2014 Six Month Update (Reference 11). These open items include previous regulatory commitments made in the July 2013 RAI Response (Reference 5). As noted in the memorandum from C.A. Hunt (NRC) to M.A. Mitchell (NRC), Summary of the November 26, 2013 Public Meeting to Discuss Industry Responses to Staff Interim Evaluations for Spent Fuel Pool Instrumentation

(Reference 9), the ISE questions supersede any previous requests for information issued by the staff concerning the spent fuel pool instrumentation.

Table 2
Status of NMP1 Reliable Spent Fuel Pool Instrumentation OIP Open Items

NMP1 Open Items	Status
1. Provide specific requirements of the procedure controlling irradiated equipment or materials stored in the SFP, including details of the analysis to be performed, to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	**Deleted (2/2014)** Superseded by ISE RAIs
2. The final system component locations and wire routings will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	**Deleted (2/2014)** Superseded by ISE RAIs
3. The full hydrodynamic/seismic qualification details will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	**Deleted (2/2014)** Superseded by ISE RAIs
4. The final mounting details for the horn antenna and waveguide assembly will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	**Deleted (2/2014)** Superseded by ISE RAIs
5. Further details of the qualification and test program used to confirm the reliability of the permanently installed equipment during and following Beyond Design Bases Events will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	**Deleted (2/2014)** Superseded by ISE RAIs
6. Further details on independence and channel separation of the permanently installed equipment will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	**Deleted (2/2014)** Superseded by ISE RAIs
7. Further details on the AC and DC power supplies of the permanently installed equipment will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	**Deleted (2/2014)** Superseded by ISE RAIs
8. The final calibration methodology will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	**Deleted (2/2014)** Superseded by ISE RAIs
9. Specific details of the functional and calibration test program, including frequencies, will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	**Deleted (2/2014)** Superseded by ISE RAIs

Table 2
Status of NMP1 Reliable Spent Fuel Pool Instrumentation OIP Open Items (cont'd)

10. The preventive maintenance, test and calibration program will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	**Deleted (2/2014)** Superseded by ISE RAIs
11. The compensatory actions to take when both channels are out of service, and the applicable administrative requirements and implementation procedures will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	**Deleted (2/2014)** Superseded by ISE RAIs
12. The compensatory actions to take when a channel is not restored within 90 days, and the applicable administrative requirements and implementation procedures will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	**Deleted (2/2014)** Superseded by ISE RAIs

Table 3 provides a summary status of the ISE RAIs. The following is a list of open items that have changed status since the last Six Month Update with an explanation of the changes:

1. **ISE RAI #1:** Confirm that the correct elevation for Level 2 at NMP1 is 321 ft. 11.5 in. and provide the information regarding specific requirements of the procedure controlling irradiated equipment or materials stored in the SFP, including details of the analysis to be performed to determine the projected dose rate impact and the appropriate Level 2 value as a result of the potential for irradiated material to be stored in the SPF in the future.

   This item is **submitted for closure**.

   As defined in NEI 12-02, Level 2 represents the range of water level where any necessary operations in the vicinity of the spent fuel pool can be completed without significant dose consequences from direct gamma radiation from the stored spent fuel and can be based on either 10 feet above the highest point of any fuel rack or at a designated level that is based upon plant-specific calculations. Subsequent to the submittal of the OIP and the last Six Month Update, NMP has elected to change its strategy of utilizing plant-specific calculations and will utilize the option to set Level 2 at an elevation 10 feet above the highest point of any fuel rack seated in the spent fuel pools. This results in a new Level 2 elevation of 325 ft. 11.5 in. No new procedural controls are required. This information was provided and reviewed during the November 2014 NRC Audit.

2. **ISE RAI #2:** Provide a final labeled sketch or marked-up plant drawing of the plan view of the SFP, depicting the SFP inside dimensions, the planned locations/placement of the primary and back-up SFP level sensor, and the proposed routing of the cables that will extend from these sensors toward the location of the read-out/display device.

   This item **is submitted for closure**.

   These documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

3. **ISE RAI #3:** Provide the results of the analyses used to verify the design criteria and methodology for seismic testing of the SFP instrumentation and the electronics units, including design basis maximum seismic loads and the hydrodynamic loads that could result from pool sloshing or other effects that could accompany such seismic forces.

   This item **is submitted for closure.**

   A bounding seismic response spectra was used to qualify the components for NMP1. Hydrodynamic loads were developed and applied to the level sensor horn, tubing and support. No other effects related to the seismic loads or hydrodynamic loads were identified.

   Qualification documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

4. **ISE RAI #4:** For each of the mounting attachments required to attach SFP Level equipment to plant structures, please describe the design inputs and the methodology that was used to qualify the structural integrity of the affected structures/equipment.

   This item is **submitted for closure**.

   Conduit and cable installation utilized standard safety-related seismic supports and were installed using existing approved specifications. Steel support design generally utilized AISC 8th Edition "Design Manual For Steel Construction" methodology. The AREVA sensor mount and horn assembly mounts were qualified using AISC 9th Edition "Design Manual For Steel Construction" methodology.

   Qualification documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

5. **ISE RAI #5:** Provide information indicating (a) whether the 80c rating for the sensor electronics is a continuous duty rating; and, (b) what will be the maximum expected ambient temperature in the room in which the sensor electronics will be located under BDB conditions in which there is no ac power available to run Heating Ventilation and Air Conditioning (HVAC) systems.

   This item is **submitted for closure**.

   The 80°C rating for the sensor electronics is a continuous duty rating. A GOTHIC Model for an ELAP event, ECP-13-000651-MU-009 S0-GOTHIC-ELAP001-N/A, was prepared for the Reactor Building (secondary containment) to determine the maximum temperatures at various elevations in the Reactor Building. For NMP1, the maximum temperature at the sensor location is expected to be 122°F. The results indicate that at the location of the SFP Level sensor electronics, the maximum expected ambient temperature will not exceed the qualified temperature of the equipment, 176°F, per Areva report 51-9202556-005.

   Qualification documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

6. **ISE RAI #6:** Provide information indicating the maximum expected relative humidity in the room in which the sensor electronics will be located under BDB conditions, in which there is no AC power available to run HVAC systems, and whether the sensor electronics is capable of continuously performing its required functions under this expected humidity condition.

   This item is **submitted for closure**.

   The sensor electronics will be located at elevation 323 feet in the NMP1 Reactor Building, where the maximum expected relative humidity is 100%. The sensor electronics are qualified per Areva report 51-9202556-005 for the maximum expected relative humidity (100% RH) to operate continuously and perform all required functions for a minimum of 7 days following the ELAP event.

   Qualification documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

7. **ISE RAI #7:** Provide analysis of the maximum expected radiological conditions (dose rate and total integrated dose) to which the sensor and associated co-located electronic equipment will be exposed. Also, please provide documentation indicating how it was determined that the electronics for this equipment is capable of withstanding a total integrated dose of $1X10^3$ Rads. Please discuss the time period over which the analyzed total integrated dose was applied.

   This item is **submitted for closure**.

   Instruments installed during 2014 are expected to operate for 15 years (remaining license). This will result in a normal operation dose of 262.8 rad (2 mrem/hr x 8760 hr/yr x 15 yr x 0.001 rad/mrem). When added to the event dose, the total exposure is 274 rad, which is much smaller than the 1000 rad limit.

   Qualification documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

8. **ISE RAI #8:** Provide information describing the evaluation of the comparative sensor design, the shock test method, test results, and forces applied to the sensor applicable to its successful tests demonstrating that the referenced previous testing provides an appropriate means to demonstrate reliability of the sensor under the effects of severe shock.

   This item is **submitted for closure**.

   The VEGAPULS 62 ER through air radar sensor is similar in form, fit and function to the VEGAPULS 66 including PLICSCOM indicator that was shock tested in accordance with MIL-S-901D and vibration tested in accordance with MIL STD-167-1.

   Qualification documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

9. **ISE RAI #9:** Provide information describing the evaluation of the comparative sensor design, the vibration test method, test results, and the forces and their frequency ranges and

directions applied to the sensor applicable to its successful tests, demonstrating that the referenced previous testing provides an appropriate means to demonstrate reliability of the sensor under the effects of high vibration.

This item is **submitted for closure**.

The VEGAPULS 62 ER through air radar sensor is similar in form, fit and function to the VEGAPULS 66 including PLICSCOM indicator that was shock tested in accordance with MIL-S-901D and vibration tested in accordance with MIL STD-167-1.

Qualification documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

10. **ISE RAI #10:** Provide information describing the evaluation of the comparative display panel ratings against postulated plant conditions. Also provide results of the manufacturer's shock and vibration test methods, test results, and the forces and their frequency ranges and directions applied to the display panel associated with its successful tests.

    This item is **submitted for closure**.

    NMP1 uses the Yokogawa analog indicator model 180 for SFP Level Display. This instrument is the same as the GE Model 180 (Yokogawa purchased the instrument design from GE), which was seismically qualified, including shock and vibration, in accordance with GE Test Specification 225A5766. The indicator was qualified in accordance with IEEE 344-1971. The specification requires sinusoidal excitation testing at 1.75g in both horizontal and vertical axis, over the range of frequencies from 1 – 33 hertz. The test criterion is that the indicator be fully functional following the seismic testing.

    Qualification documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

11. **ISE RAI #11:** Provide the results of seismic testing per IEEE 344-2004, to demonstrate the reliability of the components within the power and control panel with regard to shock and vibration effects.

    This item is **submitted for closure**.

    The power control panel was shock tested per EN 60068-2-27 (10g, 6 ms) and vibration tested per EN 60068-2-6 (2g, 200 Hz). The testing included 5 – 200 Hz sweeps in each of three axes and ten 10g shocks in two directions in each of three axes. Dwell testing was performed at resonant points determined during the frequency sweep. The dwell testing included three 90 minute dwell tests at three frequencies in the x-axis, three 90 minute dwell tests at three resonant frequencies in the y-axis, and four 90 minute dwell tests at four resonant frequencies in the z-axis. The severity of these tests was evidenced by worn insulation of wires in a wiring harness that was located more than a half-inch from the metal object which they vibrated against. This amount of vibration and physical displacement of wiring could not credibly occur in actual installations with the panel rigidly mounted to seismically qualified structures as intended. Also, these components are mounted to vibration dampeners to further minimize the transfer of external vibration to these components.

Qualification documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

12. **ISE RAI #12:** Provide analysis of the seismic testing results and show that the instrument performance reliability, following exposure to simulated seismic conditions representative of the environment anticipated for the SFP structures at Nine Mile Point, has been adequately demonstrated.

    This item is **submitted for closure**.

    A seismic shake test was performed to the requirements of IEEE 344-2004 for elements of the VEGAPULS 62 ER Through Air Radar system to levels anticipated to envelope most if not all plants in the United States. The equipment qualified included the VEGAPULS 62 ER sensor, PLICSCOM indicating and adjustment module, VEGADIS 62 display, Power Control Panel, rotatable horn waveguide assembly, waveguide piping including standard and repair flanges, and pool end and sensor end mounting brackets. The system was monitored for functionality before and after the resonance search and seismic tests. The required response spectra used for the five Operating Basis Earthquakes (OBEs) and one SSE in the test were taken from EPRI TR-107330, Figure 4-5. Seismic test results were found to be acceptable.

    Qualification documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

13. **ISE RAI #13:** Provide the final configuration of the power supply source for each channel so that the staff may conclude that the two channels are independent from a power supply assignment perspective.

    This item is **started**.

    As a result of changes during installation, the information previously provided during the November 2014 FLEX NRC audit is being revised. Final one-line drawings will be provided on the ePortal prior to final closure.

14. **ISE RAI #14:** Provide the results of the calculation depicting the battery backup duty cycle requirements demonstrating that its capacity is sufficient to maintain the level indication function until offsite resource availability is reasonably assured.

    This item is **submitted for closure**.

    Areva Engineering Information Record Report 51-9202556-005 provides the results of the calculation for the minimum battery life given worst case assumptions for temperature and discharge rate. The Control Panel contains eight Tadiran Model TL-5920 C-cell lithium batteries that provide backup power when normal 120VAC power is not available. The battery storage life is reported by the manufacturer to be up to 20 years. The battery life for worst case condition of 20 milliamps (mA) discharge rate is derived from the manufacturer technical data sheet. Examining the Capacity vs. Current curve for 20 mA discharge rate, it is seen that for -30°C (-22°F), the lifetime is 2.7 Amp-hours (Ah), or 135 hours. Because the chart considers discharge is when voltage drops from the nominal 3.6 volts down to 2.0

volts, a correction factor must be applied to determine lifetime to the point when voltage begins to significantly drop below nominal (considered to be below the full voltage point). The Discharge Characteristics @25°C curve shows that at 20 mA discharge rate, discharge to 2 volts occurs at 6.8 Ah whereas the voltage starts to significantly drop at approximately 6.6 Ah, or 97% of total discharge. Applying this factor to the lifetime determined above, the corrected lifetime is 131 hours at -30°C. The lifetime increases significantly at lower discharge rates or at higher temperatures.

The calculated battery backup times above demonstrate that the backup battery has sufficient capacity to support reliable instrument channel operation until off-site resources can be deployed. In addition, the batteries may be replaced, if required, since the power control panels are readily accessible.

Qualification documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

15. **ISE RAI #15:** Provide analysis verifying that the proposed instrument performance is consistent with these estimated accuracy normal and BDB values. Please demonstrate that the channels will retain these accuracy performance values following a loss of power and subsequent restoration of power.

    This item is **submitted for closure**.

    Analysis of the waveguide system in steam conditions is evaluated in Areva report 51-9220845-001. Demonstration of the system to operate following an interruption of power is contained in Factory Acceptance Test Report 66-9223275-000.

    Qualification documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

16. **ISE RAI #16:** Provide a list of the procedures addressing operation (both normal and abnormal response), calibration, test, maintenance, and inspection procedures that will be developed for use of the spent SFP instrumentation. The licensee is requested to include a brief description of the specific technical objectives to be achieved within each procedure.

    This item is **submitted for closure**.

    The following procedures are being revised in support of the SFPLI system:

    a.) N1-PM-S1, "Operator's Rounds Guide"
    The procedure provides guidance to Station Shift Operators on the proper method of making station rounds and maintaining shift rounds. Guidance is also provided to Station Shift Operators to monitor the status of the operating equipment required during plant extended outage conditions. The guide provides implementation of a computerized rounds data system and structured means for conducting rounds in the unlikely event that the computerized rounds system is not available. Lastly, the procedure provides guidance regarding control board walkdowns and data recording. Spent Fuel Pool Level Indication on panel PNL-54-65H will be added to the rounds.

    b.) N1-OP-6, "Fuel Pool Filtering and Cooling System"

The procedure provides a summary of the modification indicating that SFP wide range level indication is available in the Auxiliary Control Room on panel PNL-54-65H.

c.) N1-SOP-6.1, "Loss of SFP/Rx Cavity Level/Decay Heat Removal"
The procedure provides actions to restore SFP level using an alternate makeup source of water.

d.) N1-ARP-L1, "Control Room Panel L1, Alarm Response Procedure"
The procedure will be revised to indicate that the Spent Fuel Pool Level wide range can be monitored on indicator LI-54-65A and LI-54-65B on PNL-54-65H located in the Aux. Control Room. Subsequent actions will be performed as described in the current procedure.

e.) N1-ARP-SFP1, "In-Plant Panel SFP-1 Spent Fuel Pool Cooling"
The procedure will be revised to indicate that the Spent Fuel Pool Level wide range can be monitored on indicator LI-54-65A and LI-54-65B on PNL-54-65H located in the Auxiliary Control Room. Subsequent actions will be performed as described in the current procedure.

f.) N1-IPM-054-003 "Fuel Pool, Sludge Tank, and Surge Tank Level Instrumentation"
The procedure provides instructions for calibration check of Spent Fuel Pool Level Instrumentation at NMP1.

Changes to these documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

17. **ISE RAI #17:** Provide the following:

d. Further information describing the maintenance and testing program the licensee will establish and implement to ensure that regular testing and calibration is performed and verified by inspection and audit to demonstrate conformance with design and system readiness requirements. Please include a description of the plans for ensuring that necessary channel checks, functional tests, periodic calibration, and maintenance will be conducted for the level measurement system and its supporting equipment.
e. Information describing compensatory actions when both channels are out-of-order, and the implementation procedures.
f. Additional information describing expedited and compensatory actions in the maintenance procedure to address when one of the instrument channels cannot be restored to functional status within 90 days.

This item is **submitted for closure**.

d. Programmatic controls will be established to ensure the performance of periodic checks of the SFP level transmitters and indications, calibration of loop power supplies and current repeaters/isolators, and verification of system response. Procedure N1-IPM-054-003 provides the instructions for calibration checks/functional checks of SFP Level Instrumentation Channels. Procedure N1-PM-S1 directs the Shift Operator to log SFP Wide Range Levels once per twelve hour shift. Minimum and Maximum SFP Level values are identified for operator action in procedure N1-SOP-6.1. The Plant Process Computer System has alarms to notify Control Room Operators when levels indicate off-normal values.

e. NEI 12-02, Section 4.3 states "The primary or backup instrument channel can be out of service for testing, maintenance and/or calibration for up to 90 days provided the other channel is functional. Additionally, compensatory actions must be taken if the instrumentation channel is not expected to be restored or is not restored within 90 days. If both channels become non-functioning, then initiate actions within 24 hours to restore one of the channels of instrumentation and implement compensatory actions (e.g., use of alternate suitable equipment or supplemental personnel) within 72 hours." SFP level instrument may be taken out of service for testing, maintenance and/or calibration for short durations, consistent with current maintenance practices. Upon discovery of a non-functioning SFP level instrument, the issue will be placed in the Corrective Action Program. Attempts will be made to restore the non-functioning SFP level instrument to service as soon as possible and within 90 days. No compensatory actions will be taken while the one channel is non-functioning as long as the remaining instrument channel is available. If the non-functional channel cannot be restored within 90 days, compensatory actions will include enhanced monitoring of the existing SFP level instrumentation and increased direct visual monitoring of SFP level. The determination of time frames for enhanced monitoring will be defined as the procedure development is finalized. If both instrument channels are determined to be out-of-order, actions will be initiated within 24 hours to restore one of the instrument channels to full functionality within 72 hours or compensatory actions will be implemented with 72 hours. Compensatory actions will consider alternate means of monitoring SFP level, such as video cameras or supplemental shift staffing; and may consider decay heat loads in the SFP.

f. See response to e.

This response was reviewed during the November 2014 FLEX NRC audit.

18. **ISE RAI #18:** Provide a description of the in-situ calibration process at the SFP location that will result in the channel calibration being maintained at its design accuracy.

This item is **submitted for closure**.

The in-situ calibration process at the SFP location utilizes the capability to rotate the waveguide horn assembly from its normal downward-pointing position so that it can be pointed at a target that is moved along the radar beam path. By placing the moveable target at known distances from the horn, the instrument output can be checked at each target location. In the event that the as-found values are not within acceptance criteria, the measurement range can be shifted up or down to calibrate the instrument to within the required tolerance. Calibration is only required when functional or channel check identifies that the instrument requires calibration. Functional verification can be achieved using cross channel checks and functional checks per the vendor manual.

This response was reviewed during the November 2014 FLEX NRC audit.

Table 3
Status of NMP1 Reliable Spent Fuel Pool Instrumentation ISE RAIs

NMP1 ISE RAIs	Status
1. Confirm that the correct elevation for Level 2 at NMP1 is 321 ft. 11.5 in. and provide the information regarding specific requirements of the procedure controlling irradiated equipment or materials stored in the SFP, including details of the analysis to be performed to determine the projected dose rate impact and the appropriate Level 2 value as a result of the potential for irradiated material to be stored in the SPF in the future.	Submitted for closure (2/2015)
2. Provide a final labeled sketch or marked-up plant drawing of the plan view of the SFP, depicting the SFP inside dimensions, the planned locations/placement of the primary and back-up SFP level sensor, and the proposed routing of the cables that will extend from these sensors toward the location of the read-out/display device.	Submitted for closure (2/2015)
3. Provide the results of the analyses used to verify the design criteria and methodology for seismic testing of the SFP instrumentation and the electronics units, including, design basis maximum seismic loads and the hydrodynamic loads that could result from pool sloshing or other effects that could accompany such seismic forces.	Submitted for closure (2/2015)
4. For each of the mounting attachments required to attach SFP Level equipment to plant structures, please describe the design inputs, and the methodology that was used to qualify the structural integrity of the affected structures/equipment.	Submitted for closure (2/2015)
5. Provide information indicating (a) whether the 80c rating for the sensor electronics is a continuous duty rating; and, (b) what will be the maximum expected ambient temperature in the room in which the sensor electronics will be located under BDB conditions in which there is no ac power available to run Heating Ventilation and Air Conditioning (HVAC) systems.	Submitted for closure (2/2015)
6. Provide information indicating the maximum expected relative humidity in the room in which the sensor electronics will be located under BDB conditions, in which there is no ac power available to run HVAC systems, and whether the sensor electronics is capable of continuously performing its required functions under this expected humidity condition.	Submitted for closure (2/2015)
7. Provide analysis of the maximum expected radiological conditions (dose rate and total integrated dose) to which the sensor and associated co-located electronic equipment will be exposed. Also, please provide documentation indicating how it was determined that the electronics for this equipment is capable of withstanding a total integrated dose of $1X10^3$ Rads. Please discuss the time period over which the analyzed total integrated dose was applied.	Submitted for closure (2/2015)

Table 3

Status of NMP1 Reliable Spent Fuel Pool Instrumentation ISE RAIs (cont'd)

8. Provide information describing the evaluation of the comparative sensor design, the shock test method, test results, and forces applied to the sensor applicable to its successful tests demonstrating that the referenced previous testing provides an appropriate means to demonstrate reliability of the sensor under the effects of severe shock.	Submitted for closure (2/2015)
9. Provide information describing the evaluation of the comparative sensor design, the vibration test method, test results, and the forces and their frequency ranges and directions applied to the sensor applicable to its successful tests, demonstrating that the referenced previous testing provides an appropriate means to demonstrate reliability of the sensor under the effects of high vibration.	Submitted for closure (2/2015)
10. Provide information describing the evaluation of the comparative display panel ratings against postulated plant conditions. Also provide results of the manufacturer's shock and vibration test methods, test results, and the forces and their frequency ranges and directions applied to the display panel associated with its successful tests.	Submitted for closure (2/2015)
11. Provide the results of seismic testing per IEEE 344-2004, to demonstrate the reliability of the components within the power and control panel with regard to shock and vibration effects.	Submitted for closure (2/2015)
12. Provide analysis of the seismic testing results and show that the instrument performance reliability, following exposure to simulated seismic conditions representative of the environment anticipated for the SFP structures at Nine Mile Point, has been adequately demonstrated.	Submitted for closure (2/2015)
13. Provide the final configuration of the power supply source for each channel so that the staff may conclude that the two channels are independent from a power supply assignment perspective.	Started (2/2014)
14. Provide the results of the calculation depicting the battery backup duty cycle requirements demonstrating that its capacity is sufficient to maintain the level indication function until offsite resource availability is reasonably assured.	Submitted for closure (2/2015)
15. Provide analysis verifying that the proposed instrument performance is consistent with these estimated accuracy normal and BDB values. Please demonstrate that the channels will retain these accuracy performance values following a loss of power and subsequent restoration of power.	Submitted for closure (2/2015)
16. Provide a list of the procedures addressing operation (both normal and abnormal response), calibration, test, maintenance, and inspection procedures that will be developed for use of the spent SFP instrumentation. The licensee is requested to include a brief description of the specific technical objectives to be achieved within each procedure.	Submitted for closure (2/2015)

Table 3
Status of NMP1 Reliable Spent Fuel Pool Instrumentation ISE RAIs (cont'd)

17. Provide the following: a. Further information describing the maintenance and testing program the licensee will establish and implement to ensure that regular testing and calibration is performed and verified by inspection and audit to demonstrate conformance with design and system readiness requirements. Please include a description of the plans for ensuring that necessary channel checks, functional tests, periodic calibration, and maintenance will be conducted for the level measurement system and its supporting equipment. b. Information describing compensatory actions when both channels are out-of-order, and the implementation procedures. c. Additional information describing expedited and compensatory actions in the maintenance procedure to address when one of the instrument channels cannot be restored to functional status within 90 days	Submitted for closure (2/2015)
18. Provide a description of the in-situ calibration process at the SFP location that will result in the channel calibration being maintained at its design accuracy.	Submitted for closure (2/2015)

7 Potential Interim Safety Evaluation Impacts

There are no potential impacts to the Interim Safety Evaluation at this time.

8 References

The following references support the updates to the Overall Integrated Plan described in this enclosure.

1. Letter from M.G. Korsnick (CENG) to Document Control Desk (NRC), Overall Integrated Plan for Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), dated February 28, 2013 (ML13066A172)
2. NRC Order Number EA-12-051, Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, dated March 12, 2012 (ML12054A679)
3. Letter from M.G. Korsnick (CENG) to Document Control Desk (NRC), Supplement to Overall Integrated Plan for Reliable Spent Fuel Pool Instrumentation, dated March 8, 2013 (ML13073A155)
4. Letter from M. C. Thadani (NRC) to M. G. Korsnick (CENG), Nine Mile Point Nuclear Station, Units 1 and 2 – Request for Additional Information Re: Overall Integrated Plan for Reliable Spent Fuel Pool Instrumentation (Order EA-12-051)(TAC Nos. MF1131 and MF1132), dated June 5, 2013 (ML13154A399)

8 References (cont'd)

5. Letter from P. M. Swift (CENG) to Document Control Desk (NRC), Response to Request for Additional Information Re: Overall integrated Plan for Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051) (TAC Nos. MF1131 and MF1132), dated July 5, 2013 (ML13197A220)
6. Letter from E. D. Dean (CENG) to Document Control Desk (NRC), Six Month Update in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation(Order Number EA-12-051), dated August 27, 2013 (ML13254A279)
7. Letter from M.C. Thadani (NRC) to J.A. Spina (CENG), Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2, and Nine Mile Point Nuclear Station, Unit Nos. 1 and 2, Interim Staff Evaluation and Request for Additional Information Regarding The Overall Integrated Plan for Implementation of Order EA-12-051, Reliable Spent Fuel Pool Instrumentation (TAC NOS. MF1131, MF1132, MF1140, and MF1141), dated November 15, 2013 (ML13281A205)
8. NEI 12-02, Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," Revision 1, August 2012 (ML12240A307)
9. Memorandum from C.A. Hunt (NRC) to M.A. Mitchell (NRC), Summary of the November 26, 2013 Public Meeting to Discuss Industry Responses to Staff Interim Evaluations for Spent Fuel Pool Instrumentation, dated December 26, 2013 (ML13347B030)
10. Letter from M.G. Korsnick (CENG) to Document Control Desk (NRC), February 2014 Six Month Update in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), dated February 24, 2014 (ML14069A180)
11. Letter from M.G. Korsnick (CENG) to Document Control Desk (NRC), August 2014 Six Month Update in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), dated August 26, 2014 (ML14241A016)

ATTACHMENT (2)

NMP2 SIX-MONTH STATUS REPORT (FEBRUARY 2015)

FOR RELIABLE SPENT FUEL POOL INSTRUMENTATION

NINE MILE POINT NUCLEAR STATION, LLC
February 19, 2015

1 Introduction

The Nine Mile Point Unit 2 (NMP2) Overall Integrated Plan (OIP) was submitted to the Nuclear Regulatory Commission (NRC) in February 2013 (Reference 1), documenting the requirements to install reliable spent fuel pool level instrumentation (SFPLI), in response to Reference 2. Subsequently, a supplement to the OIP for SFPLI was submitted to the NRC in March 2013 (Reference 3). By letter dated June 5, 2013 (Reference 4), the NRC requested that NMP respond to a request for additional information (RAI) regarding the NMP2 OIP for Reliable Spent Fuel Pool Instrumentation. By letter dated July 5, 2013 (Reference 5), CENG responded to the June 5, 2013 RAI. By letter dated Aug 27, 2013 (Reference 6), NMP2 provided the first Six Month Update. By letter dated November 15, 2013 (Reference 7), the NRC provided NMP with its Interim Staff Evaluation (ISE) and RAI regarding the OIP for Reliable Spent Fuel Pool Instrumentation. By letter dated February 24, 2014 (Reference 10), NMP2 provided the second Six Month Update. By letter dated August 26, 2014 (Reference 11), NMP2 provided the third Six Month Update.

This attachment provides an update of milestone accomplishments since submittal of the OIP, including any changes to the compliance method, schedule, or need for relief/relaxation and associated basis (if applicable). NMP2 has completed detailed design for the SFPLI System and completed Site Acceptance Testing.

2 Milestone Accomplishments

The following milestones have been completed since the development of the OIP (Reference 1), and are current as of February 15, 2015.

- Submitted Overall Integrated Plan 1Q2013
- Issued Purchase Order for Instrumentation 2Q2013
- Commenced Engineering and Design 2Q2013
- Selected Instrumentation and Technology 2Q2013
- Submitted first Six month Update 3Q2013
- Submitted second Six Month Update 1Q2014
- Received Spent Fuel Pool Instrumentation 2Q2014
- Completed Detailed Design 2Q2014
- Commenced installation of SFPLI System 4Q2014

3 Milestone Schedule Status

Table 1 provides an update to the milestone schedule to support the OIP (References 1 and 3). It provides the activity status of each item and the expected completion date, noting any change. The dates are planning dates subject to change as design and implementation details are developed. Any changes to the following target completion dates will be reflected in future six month updates.

Table 1
Status of Reliable Spent Fuel Pool Instrumentation OIP Milestones

Milestone	Target Completion Date	Status	Revised Target Completion Date
Commence Engineering and Design	2Q2013	Complete	
Complete Engineering and Design	1Q2014	Complete	
Respond to NRC ISE RAIs	3Q2014	Complete	
Receipt of SFP Instruments	4Q2014	Complete	
Commence Installation of SFP Instruments	4Q2014	Complete	
Close out Project/Plant Turnover	2Q2016	Started	

4 Changes to Compliance Method

One change has been made to the compliance methods described in the NMP2 Overall Integrated Plant (Reference 1). This change is related to the method used to determine the Level 2 Water Level.

As defined in NEI 12-02, Level 2 represents the range of water level where any necessary operations in the vicinity of the spent fuel pool can be completed without significant dose consequences from direct gamma radiation from the stored spent fuel and can be based on either 10 feet above the highest point of any fuel rack or at a designated level that is based upon plant-specific calculations. Subsequent to the submittal of the OIP and the last Six Month Update, NMP has elected to change its strategy of utilizing plant-specific calculations and will utilize the option to set Level 2 at an elevation 10 feet above the highest point of any fuel rack seated in the spent fuel pools. This results in a new Level 2 elevation of 339 ft. 11.9 in at NMP2. No new procedural controls will are required. This information was provided and reviewed during the November 2014 NRC Audit.

No additional changes have been made to the compliance method since the August 2014 Six Month Update (Reference 11).

5 Need for Relief/Relaxation and Basis for the Relief/Relaxation

NMP2 expects to comply with the order implementation date and no relief/relaxation is required at this time.

6 Open Items from Overall Integrated Plan and Interim Safety Evaluation

Table 2 provides a status of the OIP open items documented in the August 2014 Six Month Update (Reference 11). These open items include previous regulatory commitments made in the July 2013 RAI Response (Reference 5). As noted in the memorandum from C.A. Hunt (NRC) to M.A. Mitchell (NRC), Summary of the November 26, 2013 Public Meeting to Discuss Industry Responses to Staff Interim Evaluations for Spent Fuel Pool Instrumentation (Reference

9), the ISE questions supersede any previous requests for information issued by the staff concerning the spent fuel pool instrumentation.

Table 2
Status of NMP2 Reliable Spent Fuel Pool Instrumentation OIP Open Items

NMP2 Open Items	Status
1. Provide specific requirements of the procedure controlling irradiated equipment or materials stored in the SFP, including details of the analysis to be performed, to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	**Deleted (2/2014)** Superseded by ISE RAIs
2. The final system component locations and wire routings will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	**Deleted (2/2014)** Superseded by ISE RAIs
3. The full hydrodynamic/seismic qualification details will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	**Deleted (2/2014)** Superseded by ISE RAIs
4. The final mounting details for the horn antenna and waveguide assembly will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	**Deleted (2/2014)** Superseded by ISE RAIs
5. Further details of the qualification and test program used to confirm the reliability of the permanently installed equipment during and following Beyond Design Bases Events will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	**Deleted (2/2014)** Superseded by ISE RAIs
6. Further details on independence and channel separation of the permanently installed equipment will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	**Deleted (2/2014)** Superseded by ISE RAIs
7. Further details on the AC and DC power supplies of the permanently installed equipment will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	**Deleted (2/14)** Superseded by ISE RAIs
8. The final calibration methodology will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	**Deleted (2/2014)** Superseded by ISE RAIs
9. Specific details of the functional and calibration test program, including frequencies, will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	**Deleted (2/2014)** Superseded by ISE RAIs

Table 2
Status of NMP2 Reliable Spent Fuel Pool Instrumentation OIP Open Items (cont'd)

10. The preventive maintenance, test and calibration program will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	**Deleted (2/2014)** Superseded by ISE RAIs
11. The compensatory actions to take when both channels are out of service, and the applicable administrative requirements and implementation procedures will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	**Deleted (2/2014)** Superseded by ISE RAIs
12. The compensatory actions to take when a channel is not restored within 90 days, and the applicable administrative requirements and implementation procedures will be forwarded to the NRC on February 28, 2014 with the second NMPNS Overall Integrated Plan status update.	**Deleted (2/2014)** Superseded by ISE RAIs

Table 3 provides a status of the ISE RAIs. The following is a list of open items that have changed status since the last Six Month Update with an explanation of the changes:

1. **ISE RAI #1:** Confirm that the correct elevation for Level 2 at NMP2 is 335 ft. 11.9 in. and provide the information regarding specific requirements of the procedure controlling irradiated equipment or materials stored in the SFP, including details of the analysis to be performed to determine the projected dose rate impact and the appropriate Level 2 value as a result of the potential for irradiated material to be stored in the SPF in the future.

   This item is **submitted for closure**.

   As defined in NEI 12-02, Level 2 represents the range of water level where any necessary operations in the vicinity of the spent fuel pool can be completed without significant dose consequences from direct gamma radiation from the stored spent fuel and can be based on either 10 feet above the highest point of any fuel rack or at a designated level that is based upon plant-specific calculations. Subsequent to the submittal of the OIP and the last Six Month Update, NMP has elected to change its strategy of utilizing plant-specific calculations and will utilize the option to set Level 2 at an elevation 10 feet above the highest point of any fuel rack seated in the spent fuel pools. This results in a new Level 2 elevation of 339 ft. 11.9 in at NMP2. No new procedural controls are required. This information was provided and reviewed during the November 2014 NRC Audit.

2. **ISE RAI #2:** Provide a final labeled sketch or marked-up plant drawing of the plan view of the SFP, depicting the SFP inside dimensions, the planned locations/placement of the primary and back-up SFP level sensor, and the proposed routing of the cables that will extend from these sensors toward the location of the read-out/display device.

   This item is **submitted for closure**.

   These documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

3. **ISE RAI #3:** Provide the results of the analyses used to verify the design criteria and methodology for seismic testing of the SFP instrumentation and the electronics units, including, design basis maximum seismic loads and the hydrodynamic loads that could result from pool sloshing or other effects that could accompany such seismic forces.

   This item is **submitted for closure**.

   A bounding seismic response spectra was used to qualify the components for NMP2. Hydrodynamic loads were developed and applied to the level sensor horn, tubing and support. No other effects related to the seismic loads or hydrodynamic loads were identified.

   Qualification documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

4. **ISE RAI #4:** For each of the mounting attachments required to attach SFP Level equipment to plant structures, please describe the design inputs, and the methodology that was used to qualify the structural integrity of the affected structures/equipment.

   This item is **submitted for closure**.

   Conduit and cable installation utilized standard safety-related seismic supports and were installed using existing approved specifications. Steel support design generally utilized AISC 8th Edition "Design Manual For Steel Construction" methodology. The AREVA sensor mount and horn assembly mounts were qualified using AISC 9th Edition "Design Manual For Steel Construction" methodology.

   Qualification documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

5. **ISE RAI #5:** Provide information indicating (a) whether the 80c rating for the sensor electronics is a continuous duty rating; and, (b) what will be the maximum expected ambient temperature in the room in which the sensor electronics will be located under BDB conditions in which there is no AC power available to run Heating Ventilation and Air Conditioning (HVAC) systems.

   This item is **submitted for closure**.

   The 80°C rating for the sensor electronics is a continuous duty rating. A GOTHIC Model for an ELAP event, ECP-13-000652-MU007 ES-289-N/A, was prepared for the Reactor Building (secondary containment) to determine the maximum temperatures at various elevations in the Reactor Building. For NMP2, the maximum expected temperature at the sensor location is expected to be 142°F. The results indicate that at the location of the SFP Level sensor electronics, the maximum expected ambient temperature will not exceed the qualified temperature of the equipment, 176°F, per Areva report 51-9202556-005.

   Qualification documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

6. **ISE RAI #6:** Provide information indicating the maximum expected relative humidity in the room in which the sensor electronics will be located under BDB conditions, in which there is no AC power available to run HVAC systems, and whether the sensor electronics is capable of continuously performing its required functions under this expected humidity condition.

   This item is **submitted for closure**.

   The sensor electronics will be located at elevation 333 feet in the NMP2 Reactor Building, where the maximum expected relative humidity is 100%. The sensor electronics are qualified per Areva report 51-9202556-005 for the maximum expected relative humidity (100% RH) to operate continuously and perform all required functions for a minimum of 7 days following the ELAP event.

   Qualification documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

7. **ISE RAI #7:** Provide analysis of the maximum expected radiological conditions (dose rate and total integrated dose) to which the sensor and associated co-located electronic equipment will be exposed. Also, please provide documentation indicating how it was determined that the electronics for this equipment is capable of withstanding a total integrated dose of $1X10^3$ Rads. Please discuss the time period over which the analyzed total integrated dose was applied.

   This item is **submitted for closure**.

   Instruments installed during 2014 are expected to operate for 32 years (remaining license). This will result in a worst case normal operation dose of 560.6 rad (2 mrem/hr x 8760 hr/yr x 32 yr x 0.001 rad/mrem). When added to the event dose, the total exposure is 562 rad, which is within the 1000 rad limit.

   Qualification documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

8. **ISE RAI #8:** Provide information describing the evaluation of the comparative sensor design, the shock test method, test results, and forces applied to the sensor applicable to its successful tests demonstrating that the referenced previous testing provides an appropriate means to demonstrate reliability of the sensor under the effects of severe shock.

   This item is **submitted for closure**.

   The VEGAPULS 62 ER through air radar sensor is similar in form, fit and function to the VEGAPULS 66 including PLICSCOM indicator that was shock tested in accordance with MIL-S-901D and vibration tested in accordance with MIL STD-167-1.

   Qualification documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

9. **ISE RAI #9:** Provide information describing the evaluation of the comparative sensor design, the vibration test method, test results, and the forces and their frequency ranges and directions applied to the sensor applicable to its successful tests, demonstrating that the referenced previous testing provides an appropriate means to demonstrate reliability of the sensor under the effects of high vibration.

   This item is **submitted for closure**.

   The VEGAPULS 62 ER through air radar sensor is similar in form, fit and function to the VEGAPULS 66 including PLICSCOM indicator that was shock tested in accordance with MIL-S-901D and vibration tested in accordance with MIL STD-167-1.

   Qualification documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

10. **ISE RAI #10:** Provide information describing the evaluation of the comparative display panel ratings against postulated plant conditions. Also provide results of the manufacturer's shock and vibration test methods, test results, and the forces and their frequency ranges and directions applied to the display panel associated with its successful tests.

    This item is **submitted for closure**.

    NMP2 uses the Yokogawa analog indicator model 180 for SFP Level Display. This instrument is the same as the GE Model 180 (Yokogawa purchased the instrument design from GE), which was seismically qualified, including shock and vibration, in accordance with GE Test Specification 225A5766. The indicator was qualified in accordance with IEEE 344-1971. The specification requires sinusoidal excitation testing at 1.75g in both horizontal and vertical axis, over the range of frequencies from 1 – 33 hertz. The test criterion is that the indicator be fully functional following the seismic testing.

    Qualification documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

11. **ISE RAI #11:** Provide the results of seismic testing per IEEE 344-2004, to demonstrate the reliability of the components within the power and control panel with regard to shock and vibration effects.

    This item is **submitted for closure**.

    The power control panel was shock tested per EN 60068-2-27 (10g, 6 ms) and vibration tested per EN 60068-2-6 (2g, 200 Hz). The testing included 5 – 200 Hz sweeps in each of three axes and ten 10g shocks in two directions in each of three axes. Dwell testing was performed at resonant points determined during the frequency sweep. The dwell testing included three 90 minute dwell tests at three frequencies in the x-axis, three 90 minute dwell tests at three resonant frequencies in the y-axis, and four 90 minute dwell tests at four resonant frequencies in the z-axis. The severity of these tests was evidenced by worn insulation of wires in a wiring harness that was located more than a half-inch from the metal object which they vibrated against. This amount of vibration and physical displacement of wiring could not credibly occur in actual installations with the panel rigidly mounted to seismically qualified structures as intended. Also, these components are mounted to

vibration dampeners to further minimize the transfer of external vibration to these components.

Qualification documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

12. **ISE RAI #12:** Provide analysis of the seismic testing results and show that the instrument performance reliability, following exposure to simulated seismic conditions representative of the environment anticipated for the SFP structures at Nine Mile Point, has been adequately demonstrated.

    This item is **submitted for closure**.

    A seismic shake test was performed to the requirements of IEEE 344-2004 for elements of the VEGAPULS 62 ER Through Air Radar system to levels anticipated to envelope most if not all plants in the United States. The equipment qualified included the VEGAPULS 62 ER sensor, PLICSCOM indicating and adjustment module, VEGADIS 62 display, Power Control Panel, rotatable horn waveguide assembly, waveguide piping including standard and repair flanges, and pool end and sensor end mounting brackets. The system was monitored for functionality before and after the resonance search and seismic tests. The required response spectra used for the five Operating Basis Earthquakes (OBEs) and one SSE in the test were taken from EPRI TR-107330, Figure 4-5. Seismic test results were found to be acceptable.

    Qualification documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

13. **ISE RAI #13:** Provide the final configuration of the power supply source for each channel so that the staff may conclude that the two channels are independent from a power supply assignment perspective.

    This item is **started**.

    As a result of changes during installation, the information previously provided during the November 2014 FLEX NRC audit is being revised. Final one-line drawings will be provided on the ePortal prior to final closure.

14. **ISE RAI #14:** Provide the results of the calculation depicting the battery backup duty cycle requirements demonstrating that its capacity is sufficient to maintain the level indication function until offsite resource availability is reasonably assured.

    This item is **submitted for closure**.

    Areva Engineering Information Record Report 51-9202556-005 provides the results of the calculation for the minimum battery life given worst case assumptions for temperature and discharge rate. The Control Panel contains eight Tadiran Model TL-5920 C-cell lithium batteries that provide backup power when normal 120VAC power is not available. The battery storage life is reported by the manufacturer to be up to 20 years. The battery life for worst case condition of 20 milliamps (mA) discharge rate is derived from the manufacturer technical data sheet. Examining the Capacity vs. Current curve for 20 mA discharge rate, it

is seen that for -30°C (-22°F), the lifetime is 2.7 Amp-hours (Ah), or 135 hours. Because the chart considers discharge is when voltage drops from the nominal 3.6 volts down to 2.0 volts, a correction factor must be applied to determine lifetime to the point when voltage begins to significantly drop below nominal (considered to be below the full voltage point). The Discharge Characteristics @25°C curve shows that at 20 mA discharge rate, discharge to 2 volts occurs at 6.8 Ah whereas the voltage starts to significantly drop at approximately 6.6 Ah, or 97% of total discharge. Applying this factor to the lifetime determined above, the corrected lifetime is 131 hours at -30°C. The lifetime increases significantly at lower discharge rates or at higher temperatures.

The calculated battery backup times above demonstrate that the backup battery has sufficient capacity to support reliable instrument channel operation until off-site resources can be deployed. In addition, the batteries may be replaced, if required, since the power control panels are readily accessible.

Qualification documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

15. **ISE RAI #15:** Provide analysis verifying that the proposed instrument performance is consistent with these estimated accuracy normal and BDB values. Please demonstrate that the channels will retain these accuracy performance values following a loss of power and subsequent restoration of power.

    This item is **submitted for closure**.

    Analysis of the waveguide system in steam conditions is evaluated in Areva report 51-9220845-001. Demonstration of the system to operate following an interruption of power is contained in Factory Acceptance Test Report 66-9223275-000.

    Qualification documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

16. **ISE RAI #16:** Provide a list of the procedures addressing operation (both normal and abnormal response), calibration, test, maintenance, and inspection procedures that will be developed for use of the spent SFP instrumentation. The licensee is requested to include a brief description of the specific technical objectives to be achieved within each procedure.

    This item is **submitted for closure**.

    The following procedures are being revised in support of the SFPLI system:

    a.) N2-IPM-SFC-001 "Calibration of SFP Instrument Channel Loops 2SFC-LI413A, 2SFC-LI413B, and 2SFC-TI415"
    The procedure provides instructions for calibration check of Spent Fuel Pool Level Instrumentation at NMP2.

    b.) N2-OP-38, "Spent Fuel Pool Cooling and Cleanup System"
    This procedure provides a summary of the modification indicating that SFP wide range level indication is available in the NMP2 East and West Cable Chase Rooms on panels 2CEC*PNL878A and 2CEC*PNL878B.

c.) N2-ARP-873300, "2CEC*PNL873 Series 300 Alarm Response Procedures"
The following information is added to the procedure. Other than locally at the Spent Fuel Pool, Spent Fuel Pool Wide range level can be monitored on primary indicator, 2SFC-LI413A on 2CEC*PNL878A and the backup indicator, 2SFC-LI413B, on 2CEC*PNL878B located in the Control Building, 288', east and west cable chases respectively.

d.) N2-ARP-875100, "2CEC*PNL875 Series 100 Alarm Response Procedures"
The following information is added to the procedure. Other than locally at the Spent Fuel Pool, Spent Fuel Pool Wide range level can be monitored on primary indicator, 2SFC-LI413A on 2CEC*PNL878A and the backup indicator, 2SFC-LI413B on 2CEC*PNL878B located in the Control Building, 288', east and west cable chases respectively.

e.) N2-ARP-SFC-PNL130, "2SFC-PNL130 Alarm Response Procedure"
The following information is added to the procedure. Other than locally at the Spent Fuel Pool, Spent Fuel Pool Wide range level can be monitored on primary indicator, 2SFC-LI413A on 2CEC*PNL878A and the backup indicator, 2SFC-LI413B on 2CEC*PNL878B located in the Control Building, 288', east and west cable chases respectively.

f.) N2-PM-S014 Rounds "Operator Rounds Guide"
The procedure provides guidance to Station Shift Operators on the proper method of making station rounds and maintaining shift rounds. Guidance is also provided to Station Shift Operators to monitor the status of the operating equipment required during plant extended outage conditions. The guide provides implementation of a computerized rounds data system and structured means for conducting rounds in the unlikely event that the computerized rounds system is not available. Lastly, the procedure provides guidance regarding control board walkdowns and data recording. Spent Fuel Pool Level Indication on panels 2CEC*PNL-878A and 2CEC*PNL-878B will be added to the rounds.

Changes to these documents were provided for review during the November 2014 NRC audit and are available for further review as necessary.

17. **ISE RAI #17:** Provide the following:

d. Further information describing the maintenance and testing program the licensee will establish and implement to ensure that regular testing and calibration is performed and verified by inspection and audit to demonstrate conformance with design and system readiness requirements. Please include a description of the plans for ensuring that necessary channel checks, functional tests, periodic calibration, and maintenance will be conducted for the level measurement system and its supporting equipment.
e. Information describing compensatory actions when both channels are out-of-order, and the implementation procedures.
f. Additional information describing expedited and compensatory actions in the maintenance procedure to address when one of the instrument channels cannot be restored to functional status within 90 days.

This item is **submitted for closure**.

d. Programmatic controls will be established to ensure the performance of periodic checks of the SFP level transmitters and indications, calibration of loop power supplies and current repeaters/isolators, and verification of system response. Procedure N2-IPM-SFC-001 provides the instructions for calibration checks/functional checks of SFP Level Instrumentation Channels. Procedure N2-PM-S014 directs the Shift Operator to log SFP Wide Range Levels once per twelve hour shift. Minimum and Maximum SFP Level values are identified for operator action in procedureN2-OP-38. The Plant Process Computer System has alarms to notify Control Room Operators when levels indicate off-normal values.
e. NEI 12-02, Section 4.3 states "The primary or backup instrument channel can be out of service for testing, maintenance and/or calibration for up to 90 days provided the other channel is functional. Additionally, compensatory actions must be taken if the instrumentation channel is not expected to be restored or is not restored within 90 days. If both channels become non-functioning, then initiate actions within 24 hours to restore one of the channels of instrumentation and implement compensatory actions (e.g., use of alternate suitable equipment or supplemental personnel) within 72 hours." SFP level instrument may be taken out of service for testing, maintenance and/or calibration for short durations, consistent with current maintenance practices. Upon discovery of a non-functioning SFP level instrument, the issue will be placed in the Corrective Action Program. Attempts will be made to restore the non-functioning SFP level instrument to service as soon as possible and within 90 days. No compensatory actions will be taken while the one channel is non-functioning as long as the remaining instrument channel is available. If the non-functional channel cannot be restored within 90 days, compensatory actions will include enhanced monitoring of the existing SFP level instrumentation and increased direct visual monitoring of SFP level. The determination of time frames for enhanced monitoring will be defined as the procedure development is finalized. If both instrument channels are determined to be out-of-order, actions will be initiated within 24 hours to restore one of the instrument channels to full functionality within 72 hours or compensatory actions will be implemented with 72 hours. Compensatory actions will consider alternate means of monitoring SFP level, such as video cameras or supplemental shift staffing; and may consider decay heat loads in the SFP.
f. See response to e.

This response was reviewed during the November 2014 FLEX NRC audit.

18. **ISE RAI #18:** Provide a description of the in-situ calibration process at the SFP location that will result in the channel calibration being maintained at its design accuracy.

This item is **submitted for closure**.

The in-situ calibration process at the SFP location utilizes the capability to rotate the waveguide horn assembly from its normal downward-pointing position so that it can be pointed at a target that is moved along the radar beam path. By placing the moveable target at known distances from the horn, the instrument output can be checked at each target location. In the event that the as-found values are not within acceptance criteria, the measurement range can be shifted up or down to calibrate the instrument to within the required tolerance. Calibration is only required when functional or channel check identifies that the instrument requires calibration. Functional verification can be achieved using cross channel checks and functional checks per the vendor manual.

This response was reviewed during the November 2014 FLEX NRC audit.

Table 3
Status of NMP2 Reliable Spent Fuel Pool Instrumentation ISE RAIs

NMP2 ISE RAIs	Status
1. Confirm that the correct elevation for Level 2 at NMP2 is 335 ft. 11.9 in. and provide the information regarding specific requirements of the procedure controlling irradiated equipment or materials stored in the SFP, including details of the analysis to be performed to determine the projected dose rate impact and the appropriate Level 2 value as a result of the potential for irradiated material to be stored in the SPF in the future.	Submitted for closure (2/2015)
2. Provide a final labeled sketch or marked-up plant drawing of the plan view of the SFP, depicting the SFP inside dimensions, the planned locations/placement of the primary and back-up SFP level sensor, and the proposed routing of the cables that will extend from these sensors toward the location of the read-out/display device.	Submitted for closure (2/2015)
3. Provide the results of the analyses used to verify the design criteria and methodology for seismic testing of the SFP instrumentation and the electronics units, including, design basis maximum seismic loads and the hydrodynamic loads that could result from pool sloshing or other effects that could accompany such seismic forces.	Submitted for closure (2/2015)
4. For each of the mounting attachments required to attach SFP Level equipment to plant structures, please describe the design inputs, and the methodology that was used to qualify the structural integrity of the affected structures/equipment.	Submitted for closure (2/2015)
5. Provide information indicating (a) whether the 80c rating for the sensor electronics is a continuous duty rating; and, (b) what will be the maximum expected ambient temperature in the room in which the sensor electronics will be located under BDB conditions in which there is no ac power available to run Heating Ventilation and Air Conditioning (HVAC) systems.	Submitted for closure (2/2015)
6. Provide information indicating the maximum expected relative humidity in the room in which the sensor electronics will be located under BDB conditions, in which there is no ac power available to run HVAC systems, and whether the sensor electronics is capable of continuously performing its required functions under this expected humidity condition.	Submitted for closure (2/2015)

Table 3
Status of NMP2 Reliable Spent Fuel Pool Instrumentation ISE RAIs (cont'd)

7. Provide analysis of the maximum expected radiological conditions (dose rate and total integrated dose) to which the sensor and associated co-located electronic equipment will be exposed. Also, please provide documentation indicating how it was determined that the electronics for this equipment is capable of withstanding a total integrated dose of $1X10^3$ Rads. Please discuss the time period over which the analyzed total integrated dose was applied.	Submitted for closure (2/2015)
8. Provide information describing the evaluation of the comparative sensor design, the shock test method, test results, and forces applied to the sensor applicable to its successful tests demonstrating that the referenced previous testing provides an appropriate means to demonstrate reliability of the sensor under the effects of severe shock.	Submitted for closure (2/2015)
9. Provide information describing the evaluation of the comparative sensor design, the vibration test method, test results, and the forces and their frequency ranges and directions applied to the sensor applicable to its successful tests, demonstrating that the referenced previous testing provides an appropriate means to demonstrate reliability of the sensor under the effects of high vibration.	Submitted for closure (2/2015)
10. Provide information describing the evaluation of the comparative display panel ratings against postulated plant conditions. Also provide results of the manufacturer's shock and vibration test methods, test results, and the forces and their frequency ranges and directions applied to the display panel associated with its successful tests.	Submitted for closure (2/2015)
11. Provide the results of seismic testing per IEEE 344-2004, to demonstrate the reliability of the components within the power and control panel with regard to shock and vibration effects.	Submitted for closure (2/2015)
12. Provide analysis of the seismic testing results and show that the instrument performance reliability, following exposure to simulated seismic conditions representative of the environment anticipated for the SFP structures at Nine Mile Point, has been adequately demonstrated.	Submitted for closure (2/2015)
13. Provide the final configuration of the power supply source for each channel so that the staff may conclude that the two channels are independent from a power supply assignment perspective.	Started (2/2015)
14. Provide the results of the calculation depicting the battery backup duty cycle requirements demonstrating that its capacity is sufficient to maintain the level indication function until offsite resource availability is reasonably assured.	Submitted for closure (2/2015)
15. Provide analysis verifying that the proposed instrument performance is consistent with these estimated accuracy normal and BDB values. Please demonstrate that the channels will retain these accuracy performance values following a loss of power and subsequent restoration of power.	Submitted for closure (2/2015)

Table 3
Status of NMP2 Reliable Spent Fuel Pool Instrumentation ISE RAIs (cont'd)

16. Provide a list of the procedures addressing operation (both normal and abnormal response), calibration, test, maintenance, and inspection procedures that will be developed for use of the spent SFP instrumentation. The licensee is requested to include a brief description of the specific technical objectives to be achieved within each procedure.	Submitted for closure (2/2015)
17. Provide the following: a. Further information describing the maintenance and testing program the licensee will establish and implement to ensure that regular testing and calibration is performed and verified by inspection and audit to demonstrate conformance with design and system readiness requirements. Please include a description of the plans for ensuring that necessary channel checks, functional tests, periodic calibration, and maintenance will be conducted for the level measurement system and its supporting equipment. b. Information describing compensatory actions when both channels are out-of-order, and the implementation procedures c. Additional information describing expedited and compensatory actions in the maintenance procedure to address when one of the instrument channels cannot be restored to functional status within 90 days	Submitted for closure (2/2015)
18. Provide a description of the in-situ calibration process at the SFP location that will result in the channel calibration being maintained at its design accuracy.	Submitted for closure (2/2015)

7 Potential Interim Safety Evaluation Impacts

There are no potential impacts to the Interim Safety Evaluation at this time.

8 References

The following references support the updates to the Overall Integrated Plan described in this enclosure.

1. Letter from M.G. Korsnick (CENG) to Document Control Desk (NRC), Overall Integrated Plan for Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), dated February 28, 2013 (ML13066A172)
2. NRC Order Number EA-12-051, Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, dated March 12, 2012 (ML12054A679)
3. Letter from M.G. Korsnick (CENG) to Document Control Desk (NRC), Supplement to Overall Integrated Plan for Reliable Spent Fuel Pool Instrumentation, dated March 8, 2013 (ML13073A155)
4. Letter from M. C. Thadani (NRC) to M. G. Korsnick (CENG), Nine Mile Point Nuclear Station, Units 1 and 2 – Request for Additional Information Re: Overall Integrated Plan for Reliable Spent Fuel Pool Instrumentation (Order EA-12-051)(TAC Nos. MF1131 and MF1132), dated June 5, 2013 (ML13154A399)

8 References (cont'd)

5. Letter from P. M. Swift (CENG) to Document Control Desk (NRC), Response to Request for Additional Information Re: Overall integrated Plan for Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051) (TAC Nos. MF1131 and MF1132), dated July 5, 2013 (ML13197A220)
6. Letter from E. D. Dean (CENG) to Document Control Desk (NRC), Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), dated August 27, 2013 (ML13254A279)
7. Letter from M.C. Thadani (NRC) to J.A. Spina (CENG), Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2, and Nine Mile Point Nuclear Station, Unit Nos. 1 and 2, Interim Staff Evaluation and Request for Additional Information Regarding The Overall Integrated Plan for Implementation of Order EA-12-051, Reliable Spent Fuel Pool Instrumentation (TAC NOS. MF1131, MF1132, MF1140, and MF1141), dated November 15, 2013 (ML13281A205)
8. NEI 12-02, Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," Revision 1, August 2012 (ML12240A307)
9. Memorandum from C.A. Hunt (NRC) to M.A. Mitchell (NRC), Summary of the November 26, 2013 Public Meeting to Discuss Industry Responses to Staff Interim Evaluations for Spent Fuel Pool Instrumentation, dated December 26, 2013 (ML13347B030)
10. Letter from M.G. Korsnick (CENG) to Document Control Desk (NRC), February 2014 Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), dated February 24, 2014 (ML14069A180)
11. Letter from M.G. Korsnick (CENG) to Document Control Desk (NRC), August 2014 Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), dated August 26, 2014 (ML14241A016)